

Designing the Ultimate Can Crusher



Objective

To help students understand simple machines and manipulate materials and tools to build their own machine.



Activity Description

Students work in teams to design and construct a machine to crush aluminum cans. Students then vote for the best design.



Materials Needed

- Construction items listed in the box below
- Hammer
- Saw
- Screwdriver
- Pliers
- Wire cutters
- Ruler and/or measuring tape



Key Vocabulary Words

Recycling
Recyclables
Compaction



Duration

Set-up/design: 1 hour
Construction: 1 to 2 hours



Skills Used

Research
Computation
Motor skills



Activity

Step 1: Several days before the lesson, ask students to bring in different construction items from the list to the right. Be sure to store these items in a safe place at the school where students cannot access them and hurt themselves. Also, note that this lesson will work best in a shop room or similar area with plenty of open space and room for students to work.

Step 2: To begin the lesson, introduce the concept of simple machines—levers, pulleys, etc. Next, explain how simple machines are used in the recycling process. Recycling facilities use machines, for example, to crush aluminum cans

Construction Items

Aluminum cans
Rope
Wire
Hinges
Screws
Nails
Wood scraps
Bricks
Blocks
Other construction items



math



science



art



Journal Activity

Ask students to describe the most challenging part of designing their can crusher. Ask them how they overcame this challenge.

to make them easier to store and ship since they require less space when crushed (Refer to the Teacher Fact Sheet titled *Recycling* on page 73 for more information on this process).

Step 3: Divide the class into small groups of four or five students.

Step 4: Place a few aluminum cans on the floor. Ask a volunteer to crush the cans with his or her foot. Have students identify what is involved in crushing a can. Ask them to describe what happens to the can.

Step 5: Have students examine all of the construction materials brought to class. Explain that the job of each group is to use these materials to design and construct a can crushing machine. Each group should use at least one “simple machine” in their construction.

Step 6: Tell students that they should begin the project with a design phase. You may want to spend several class periods on this stage. Ask students to work together to draw a diagram for how their can crusher would work. Have them make a list of all of the items they will need for their machine. Make sure these items are already in the classroom or can be brought from home. Ask students to write instructions for how they will build their can crusher. Encourage them to take measurements and be as detailed as possible.

Step 7: Review each group’s designs carefully to ensure they are reasonable given the materials required and time frame of the assignment. Ask each group to explain to you how their machine will work.

Step 8: Conduct a safety lesson regarding the appropriate use of the tools. Ask students to use caution and remember that the tools are not toys.

Step 9: Under close adult supervision (you might need adult volunteers to help), ask students to begin the construction phase. It may take several class periods for students to complete their can crushers. Have students follow their directions carefully and encourage them to ask questions throughout the process.

Step 10: Once all of the machines are constructed, tell students that it is time to test them. Ask each group of students to demonstrate to the class how their can crusher works. Allow other students to ask questions.



Assessment

1. Ask students to explain why it is important for recycling facilities to crush the aluminum cans.
2. Ask students why it is important to develop a detailed design first rather than immediately building a machine.
3. Have students explain why it is important to test the machine.
4. Have students explain how the machine makes crushing cans easier than doing it by hand.

After everyone has demonstrated their crushers, have each student rank each project on a scale of 1 to 10 for each of several categories, such as: total cost of materials, ease of use, efficiency, size, safety, effectiveness, time to construct, etc.



Enrichment

1. Organize a recycling drive for aluminum cans at your school. The can crusher contest can be used to draw attention to the drive. The can crushers designed by the students can be used to help store the cans more easily before they are taken to a recycling center.
2. Invite a local recycling coordinator or recycling professional to your class to talk with students about what he or she does. Ask the visitor to bring in pictures of baled, crushed recyclables as well as samples of recycled products, if possible.